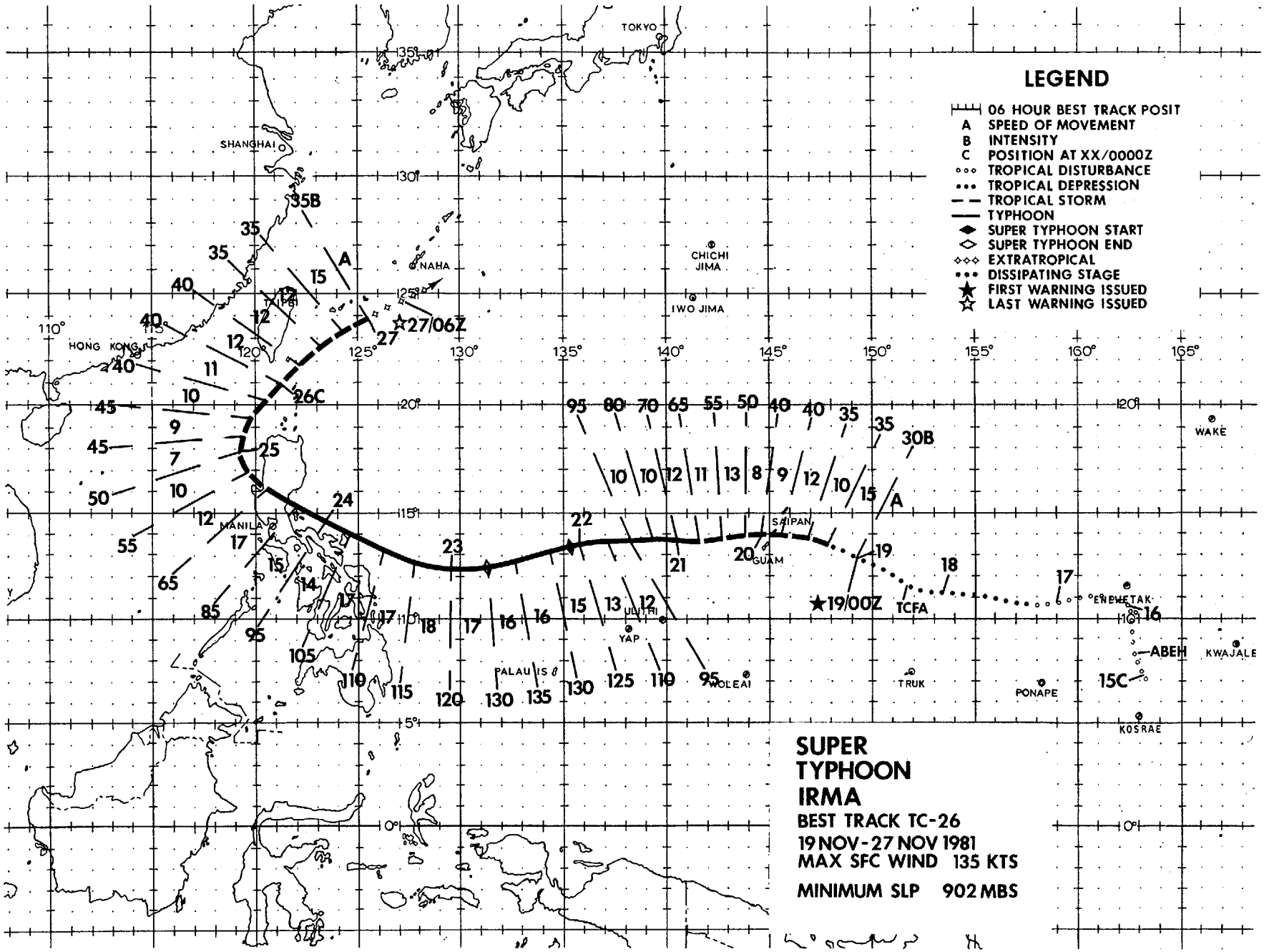
LEGEND
06 HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SUPER
TYPHOON
IRMA
BEST TRACK TC-26
19 NOV - 27 NOV 1981
MAX SFC WIND 135 KTS
MINIMUM SLP 902 MBS
TOKYO
SHANGHAI
NAHA
CHICHI JIMA
IWO JIMA
HONG KONG
MANILA
SAIPAN
GUAM
YAP
ULITHI
WOLEAI
TRUK
PONAPE
KOSRAE
ENEWETAK
ABEH
KWAJALE
WAKE
PALAU IS
☆27/06Z
★19/00Z TCFA
35B
30B
26C
15C

Super Typhoon Irma was the second of three tropical cyclones (Hazen(25), Irma (26), and Jeff(27)) to form in an active equatorial trough between 150E to 170E near 10N during the middle weeks of November. Reaching a maximum intensity of 135 kt (69 m/sec) and a minimum sea-level pressure of 902 mb, Irma was the strongest of the three storms, and fortunately, also the best "behaved" and the easiest to forecast.

When the area of enhanced convection that eventually became Typhoon Hazen formed near 10N 165E on 10 November, a zone of strong convective activity, located between 8N and 10N, stretched eastward from 165E to 150W. During the following week, westward propagating cloud clusters, as referenced in Ruprecht and Gray (1976) supported by convergence in the low-level easterly flow plus a strong upper-level divergent pattern, could be seen forming and dissipating along the entire zone. Throughout the period neither the data-sparse regions east of 170E, nor the satellite data, suggested the existence of a low-level circulation. Synoptic data along the western periphery of the zone, between 160E and 170E, did indicate the possibility of several minor troughs, or small circulations, propagating from the east. Similar synoptic situations existed for each of the three systems, i.e. Hazen, Irma, and Jeff; there was also a fourth circulation, detected on 12 November near 10N 161E. This latter system quickly dissipated because of the immediate proximity of the developing Hazen, a stronger cyclone.

The convective disturbance that spawned Super Typhoon Irma was first mentioned in the Significant Tropical Weather Advisory Bulletin (ABEH PGTW) on 15 November. Synoptic data indicated a circulation east of Ponape (WMO 91348) at 7N 163E and satellite imagery showed that a westward moving cloud cluster in the area beginning to develop an upper-level anticyclone. However, as the system moved north and then west during the ensuing three days, the convection fluctuated, then weakened greatly. A large clear subsidence region which extended 600 nm (1111 km) eastward from Typhoon Hazen seemed to hinder any further development (as it did for the 12 November circulation). However, by 181200Z Hazen had moved far enough to the west for the convection to once again increase in intensity as well as organization. A Tropical Cyclone Formation Alert (TCFA) was issued at 181641Z (Fig. 3-26-1). The following morning, an aircraft investigative mission found a central sea-level pressure of 1003 mb with 30 kt (15 m/sec) winds and the first warning was issued on Tropical Depression 26 at 190000Z.

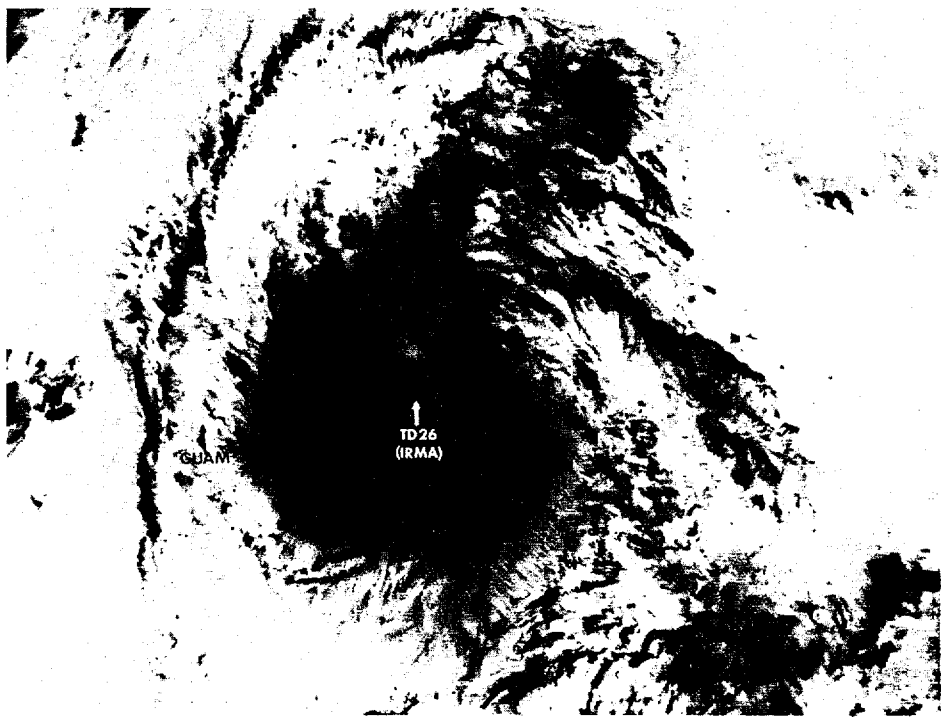

FIGURE 3-26-1. Tropical Depression 26 approximately 300 nm (556 km) east of Guam just prior to the first warning. Note the good outflow pattern developing with this system, 18 November, 2156Z. (NOAA 6 infrared imagery)

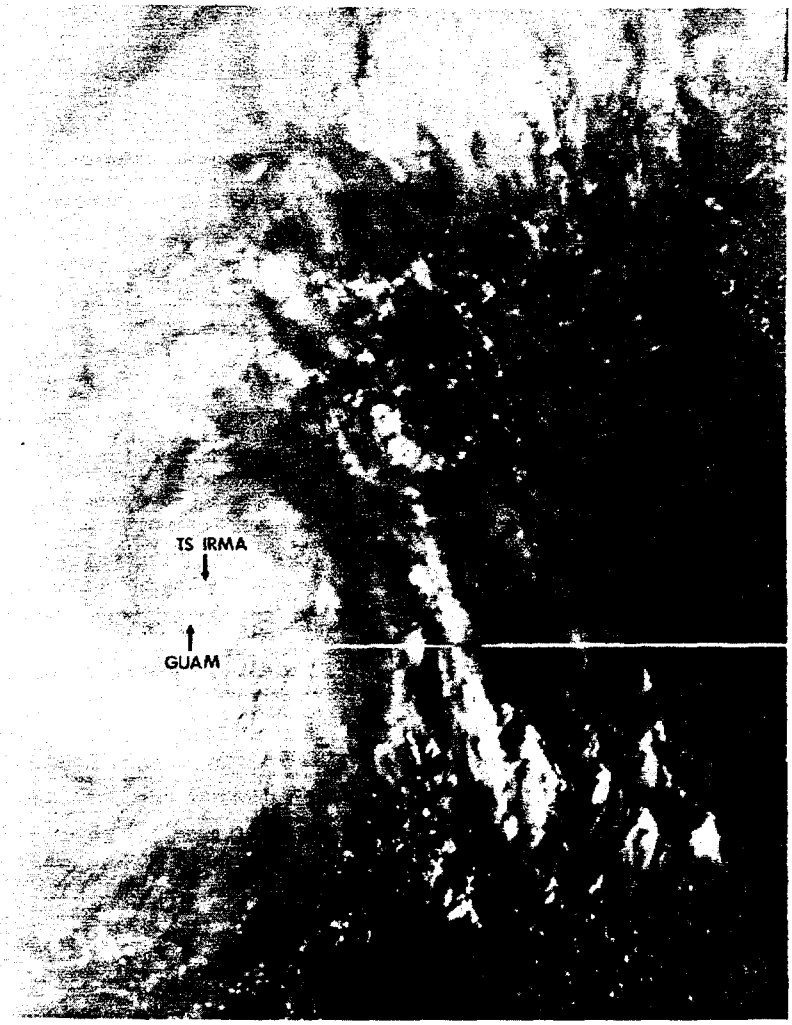

FIGURE 3-26-2. Tropical Storm Irma near its closest approach to Guam, 19 November, 2132Z. The extension of clouds just north of Irma are associated with a frontal system which was also near its closest approach to Guam. (NOAA 6 visual imagery)

Tropical Storm Irma passed just north of Guam at 182230Z (Fig. 3-26-2). Fortunately, at this time, the storm was intensifying very slowly and the strongest winds were away from Guam, in the northeast quadrant. In fact, Guam did not receive its strongest winds until nearly 8 hours later (29 kt (15 m/sec), with gusts to 43 kt (22 m/sec), at the Naval Air Station, Agana) when the storm began to deepen west of Guam.

Based upon the experience gained from Typhoon Hazen, JTWC's initial forecast tracks ignored the temptation to forecast an early recurvature into an advancing front just north of Guam. Although westerly winds north of 20N were in excess of 60 kt (31 m/sec) and 80 kt (41 m/sec) at 500 mb and 200 mb, respectively, it was deemed, that as in the case for Hazen, the strongest westerly winds associated with the front would pass too quickly to affect the storm. Furthermore, it was predicted that the strong northerly low-level flow beyond the front would force the storm back on a more westerly or southwesterly track. (JTWC's forecast errors for Super Typhoon Irma of 76, 118, and 141 nm (141, 219, and 261 km) for 24, 48, and 72 hours, respectively, were excellent - nearly half the long-term mean).

When the frontal system passed Irma and moved off to the east, the ridge at 500 mb built to the north and west of the storm. This ridge persisted along 18N throughout Irma's track towards the Philippines. Although the ridge was quite narrow and elongated, it appeared to shelter Irma from the effects of the strong westerly flow north of 20N. JTWC was able to monitor the strength of this ridge with the aid of several 500 mb synoptic tracks flown by the 54th Weather Reconnaissance Squadron (Fig. 3-26-3).

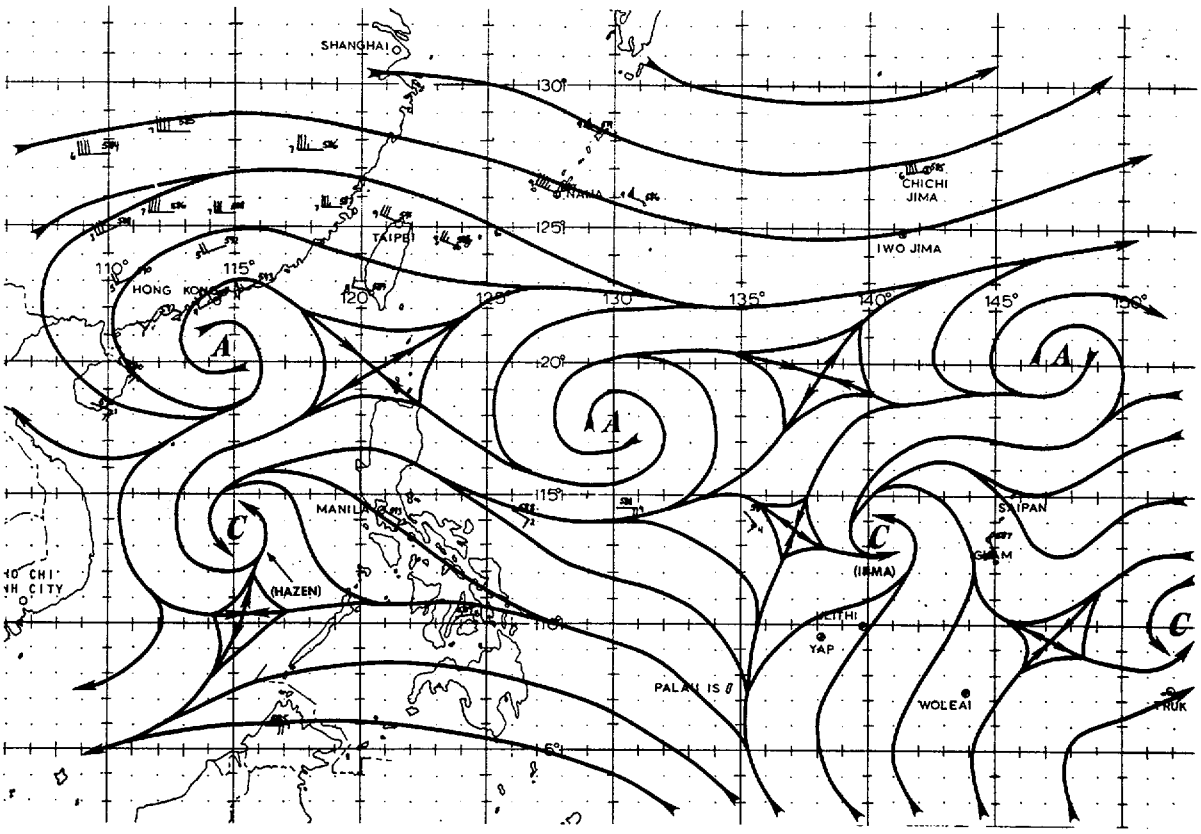

FIGURE 3-26-3. The 210000Z November 500 mb streamline analysis. Wind speeds are in knots. Data taken along 14N are a JTWC requested 500 mb synoptic track.

The 202254Z weather reconnaissance mission found that Irma's pressure had dropped to 968 mb with 68 kt (25 m/sec) surface winds (85 kt (44 m/sec), 700 mb flight level winds) and that a 40 nm (74 km) diameter eye had developed. (In post-analysis, Irma was upgraded to typhoon status at 201800Z). By 210900Z, aircraft data was applied to JTWC's empirically derived relationship between sea-level pressure and 700 mb equivalent potential temperature (Dunnavan, 1981) and suggested the potential for rapid deepening below 925 mb within the next 12 to 36 hours. Twenty-four hours later, the aircraft reconnaissance mission verified this prediction with a 905 mb minimum sea-level pressure, low enough to qualify Irma as a Super Typhoon (Fig. 3-24-4). It is interesting to note that during the time of Irma's greatest deepening, another cold front had passed approximately 500 nm (926 km) to the north. The 200 mb data indicated a 120 kt (62 m/sec) jet maximum, associated with this fast moving front, had passed just north of Irma (at 30N). This jet, along with a 50 kt (26 m/sec) easterly flow to the south of Irma supplied her with two excellent outflow channels. Irma remained at super typhoon strength for near 16 hours before slowly weakening as the western half of the circulation field began to interact with the outher edges of the Philippine Islands.

Although Irma steadily weakened before making landfall at 240900Z with 85 kt (44 m/sec) winds about 60 nm (111 km) northeast of Manila, she still caused widespread destruction (Fig. 3-26-5). Reports from the Philippines indicated more than 200 deaths with hundreds injured and a damage estimate as high as $9 million. This included the almost total destruction of 4 coastal towns in the province of Camarines Sur, 170 nm (315 km) southeast of Manila, due to 50 foot (15 m) storm surge waves and the capsizing of a ship in Manila Bay.

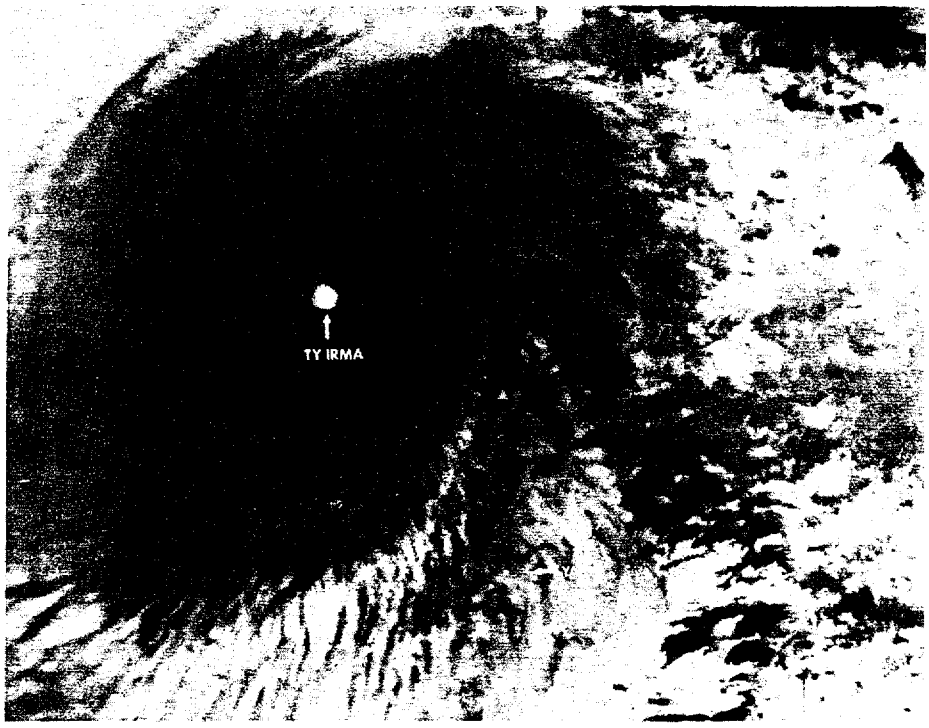

FIGURE 3-26-4. Super Typhoon Irma near maximum strength in the Philippine Sea, 22 November, 0450Z. Four hours later Irma's eye was described as an "... excellent stadium effect (with) layered clouds up to an overhead fishbowl...". (NOAA 7 infrared imagery)

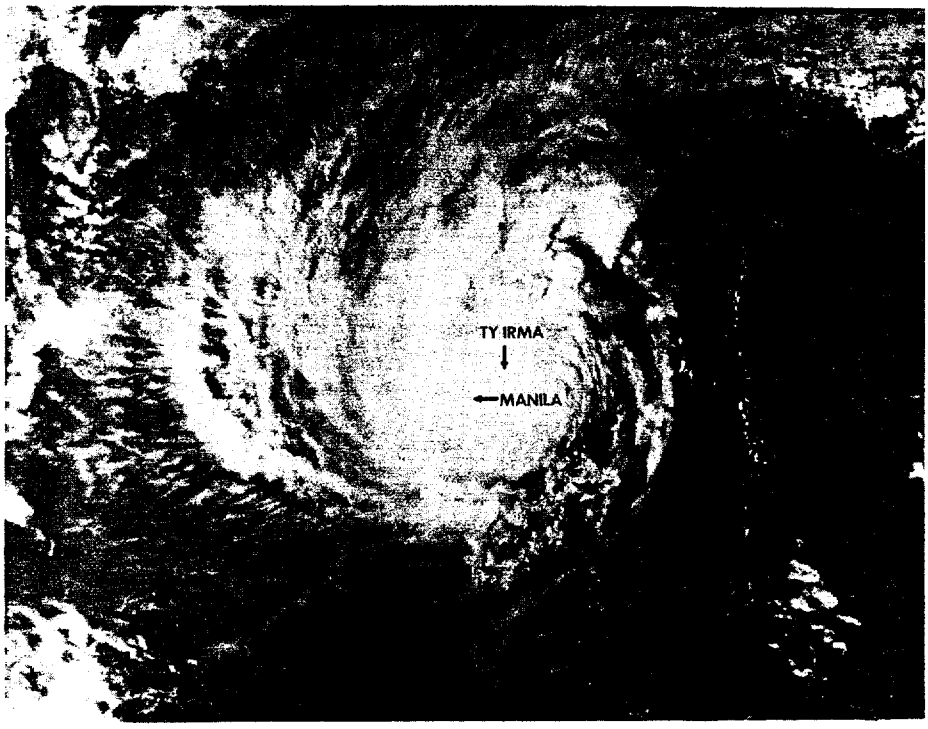

FIGURE 3-26-5. Typhoon Irma with 85 kt (44 m/sec) is only 65 nm (120 km) from Manila and three hours from reaching the coast of Luzon, 24 November, 0609Z. (NOAA 7 visual imagery)

As Irma approached the Philippines, JTWC correctly predicted that she would begin to move in a more northwesterly direction towards a break in the ridge just west of Luzon near 20N 118E. Synoptic data over Southeast Asia indicated the approach of a significant trough as evidenced by southwest winds of 70 kt (36 m/sec) at 500 mb and 80 kt (41 m/sec) at 200 mb occurring as far south as 20N. These indicators seemed to presage a situation that offered the best opportunity for Irma to recurve.

Irma lost her typhoon strength winds at 241200Z just before entering Lingayen Gulf and the South China Sea. Aircraft reconnaissance ten hours later found the storm moving north and poorly organized with strong convection and winds only on her north side. By 250900Z, Irma's upper-levels began to shear towards the northeast and Irma began to recurve into the Luzon Straits in advance of the trough moving off of Asia. Irma managed to linger on for another two days before finally becoming absorbed into a cold front at 270000Z just south of the Ryukyu Islands.